Acta entomologica serbica, 2016, 21: 93-112

UDC 595.799(560)
DOI: 10.5281/zenodo.200396

DISTRIBUTION DATA FOR THE TRIBES CERATININI AND ALLODAPINI (HYMENOPTERA: APIDAE) WITH A CHECKLIST OF THE SUBFAMILY XYLOCOPINAE OF TURKEY

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Abstract

The present study is based on bee samples collected in various parts of Turkey since the 1970s. Examination of the material and an overview of the literature sources allowed us to reach the conclusion that the genus *Ceratina* Latreille (Ceratinini) includes 27 species and two subspecies, while only one species of the genus *Exoneuridia* Cockerell (Allodapini) is found in Turkey. With a current 10 *Xylocopa* species previously recorded, a total of 38 species and two subspecies in the subfamily Xylocopinae occur in the country. Each species has a different distribution range; some *Ceratina* species are abundantly or moderately distributed, but certain species are very rare: *C. christellae* has been known from Antalya and Hakkâri, *C. hakkarica* from Hakkâri, *C. neocallosa* from Nevşehir, *C. rasmonti* from Ağrı and Van, *C. warnckei* from Hakkâri, Kahramanmaraş and Şırnak, *C. schwarziana* from Hakkâri and Kars. *Ceratina chalcites ebmeri*, *C. denesi, C. hakkarica, C. rasmonti, C. warnckei* and *Exoneuridia hakkariensis* are Anatolian endemics. Moreover, 12 *Ceratina* taxa and *E. hakkariensis* have been described from Turkey, of which six taxa have type localities in Hakkâri (*C. hakkarica, C. schwarziana, C. warnckei, C. zwakhalsi, C. chalcites ebmeri* and *E. hakkariensis*). Thus, the eastern part of Turkey, especially Hakkâri, is a very important speciation center for Ceratinini bees. For most of the species, new distribution records are provided, and plant species visited and nesting sites are included. It was first determined that *C. bispinosa* and *E. hakkariensis* visited *Capsicum annuum* L., which is the most common and extensively cultivated vegetable in Turkey. For rare taxa, a distribution map was established. Furthermore, a checklist for the Turkish Xylocopinae is provided for the first time.

KEY WORDS: Xylocopinae, Ceratinini, Allodapini, *Ceratina, Exoneuridia,* fauna, checklist, Turkey

Introduction

The subfamily Xylocopinae (Hymenoptera: Apidae), commonly referred to as “carpenter bees”, comprise four tribes, Xylocopini, Ceratinini, Allodapini and Manuelini in the family Apidae (Sakagami and Michener, 1987; Terzo *et al.*, 2007). The first three tribes occur in Turkey (Warncke 1983; Terzo, 1999; Terzo *et al.*, 1999; Özbek, 2013a), but Manuelini is not present. Xylocopini and Ceratinini have a worldwide distribution and each is represented by a single genus: *Xylocopa* Latreille, the large carpenter bee, and *Ceratina* Latreille, the small carpenter bee: Allodapini comprises several genera, of which *Exoneuridia* Cockerell is the only genus occurring in the Western Palearctic region (Terzo, 1999).

The tribe Ceratinini is distinguished from other tribes by the following characters: body rather slender; usually small (2.2-12.5 mm) andreniform bees with generally shining, superficially nearly hairless bodies that vary from black to brilliantly metallic green, rarely with a red or metallic red metasoma. Most species have yellow markings at least on the face, and some have extensive yellow maculation. In females of many species, the body almost wholly dark except for a robust, vertically elongate yellow bar in the middle of the clypeus. Lateral margins of the clypeus are strongly concave, the clypeus thus shaped like a thick, inverted T, with mandibles broad at the base and abruptly narrowed medially (Michener, 2007).

The Ceratinini are mostly solitary in behavior, and excavate their nests in pithy dead stems or twigs that they enter at broken ends. The cells are unlined, usually cylindrical, and formed merely by partitions in the unbranched burrow (Daly, 1966; Terzo, 1998; Michener, 2007).

Bees in the tribe Allodapini are rather slender andreniform to hylaeiform, superficially resembling *Ceratina* except that the cuticle is soft and delicately sculptured. The most obvious tribal character is the presence of only two submarginal cells (rarely one). The clypeus is rather flat, its lower lateral angle bent back as a large tooth on each side of the labrum; the upper half of the clypeus, above the level of the tentorial pits, is not greatly narrower than the lower half, and the clypeus thus cannot be described as an inverted T as in Ceratinini. They nest in pithy or hollow stems or other cavities such as plant galls. The Allodapini are almost unique among bees in having nests without cells (Terzo, 1999; Michener, 2007). Allodapini comprise several genera, of which *Exoneuridia* Cockerell, 1911, is the only genus occurring in the Western Palearctic region (Terzo, 1999.). As regards studies of the Ceratinini fauna of Turkey, Gerstäcker (1869) described *Ceratina nigroaenea* and *C. loewi* from Turkey, type localities Antalya and Muğla, respectively. Later, *C. nigroaenea* was redescribed by Terzo & Rasmont (1996). Friese (1899) recorded some species and described *C. moricei* from Antalya; he also described *C. bifida* from Mersin. Terzo & Rasmont (1997) described *C. zwakhalsi* from Hakkâri. Several *Ceratina* species were described from Hakkâri: *C. hakkarica* by Kocourek (1998), and C. *christellae*, *C. schwarziana, C. warnckei* and *C. chalcites ebmeri* by Terzo (1998). Terzo (1998) also described *C. denesi* from Adana, *C. rasmonti* from Van and *C. sakagamii* from Kars. Terzo *et al.* (1999) studied the biogeography of the genus *Ceratina* in the Çukurova and adjacent areas and detected 12 different species. The plain fauna of the Çukurova region is mostly represented by *C. mandibularis* and other thermophile eastern Mediterranean species. Studies related to Allodapini are very scarce: Warncke (1983) described *Allodape libanensis hakkariensis* from Hakkâri. Later the genus *Exoneuridia* was revised by Terzo (1999) and three species were recognized, of which *E. hakkariensis* (Warncke, 1983) occurs in Turkey.

The aim of this paper was to present the latest available knowledge on the bee tribes Ceratinini and Allodapini of Turkey, their distribution, biology and biogeographical affinities, and to provide the first checklist for the subfamily Xylocopinae of Turkey.

Materials and Methods

The material was collected in various parts of Turkey since the 1970s, but mainly comes from eastern Anatolia. All bee specimens were collected via insect nets, and occasionally aspirators and Malaise traps were installed at various habitats during March-October. Plants visited by bees were also recorded or collected for diagnosis. All captured bee specimens and collected plants were properly prepared for collections. During the joint studies on "Nesting Biology and Immature Stages of Bees" with J. G. Rozen and J. S. Ascher (AMNH, USA), some specimens were also collected and included.

The species are presented alphabetically according to subgenera and those that could not be inspected in this work are quoted from published sources. Provinces are presented in alphabetical order. Locality data include altitude in meters above sea level. The biology section includes information on the habitat, flight season, nesting sites and flower visited, if available. If not mentioned otherwise, all material examined herein is deposited at EMET. A distribution map (Fig. 1) was prepared for the rare *Ceratina* species and *E. hakkariensis* using Google Earth.

Abbreviations: AMNH − American Museum of Natural History, New York, NY, United States; EMET − Ataturk University, Faculty of Agriculture, Entomology Museum, Erzurum, Turkey.

Results

Material collected from various parts of the country and from published sources revealed that the tribe Ceratinini was represented by 27 species and two subspecies, and the tribe Allodapini by one species only. A total of 30 taxa of the genera *Ceratina* and *Exoneuridia* inhabit Turkey.

Tribe Ceratinini

Ceratina (Ceratina) cucurbitina (Rossi, 1792)

Synonyms: *Apis cucurbitina* Rossi, 1792; *Hylaeus albilabris* Fabricius, 1793; *Ceratina decolorans* Brullé, 1832

Material examined: Antalya, Arapsuyu, Azmak, 10 m, 26.V.2004, 1♂ (on *Daucus carota* L.), leg. H. Özbek; Bilecik, Center, 600 m, 15.VI.1995, 5♀♀, leg. E. Yıldırım; Bingöl, Karlıova, Soğuk çeşme, 1415 m, 10.VII.2004, 1♀, leg. S. Çoruh; Isparta, Dere mahallesi, 1150 m, 24.V.2004, 3♂♂, 3♀♀ (on *Sambucus ebulus* L.), leg. H. Özbek; Eğirdir, Yukarı Gökdere, 1000 m, 25.V.2004, 1♂, leg. H. Özbek; İzmir, Selçuk, Havutçulu, 330 m 06.VII.1997, 1♀ (on *Vitex agnus-castus* L.), leg. H. Özbek; Konya: Güneysınır, Gürağaç, 1020 m, 28.VII.2000, 1♀, leg. M. Kesdek.

Biology: Recorded in almost all geographical regions of the country, except the Black Sea region. Specimens were collected in various habitats, including orchards, at altitude ranges between sea level (Antalya) and 1400 m a.s.l. (Bingöl). Terzo *et al*. (1999) noted that *C. cucurbitina* was very rare on the Çukurova plain below 900 m; they collected only four samples at altitudes from 500-599 m, whereas at 900-1100 m a.s.l. (Taurus Mountains), 118 samples were collected and it was the most abundant among 12 *Ceratina* species. The present study shows that it occurs from sea level to 1500 m. The flight season is from May to the end of August. A record of the visited flowers, *Daucus carota*, *Sambucus ebulus* L. and *Vitex agnus-castus* L. by Terzo & Rasmont (2011) indicated that it is a polylectic species, visiting various plant species. They also

noted the stems of *Rubus* sp., *D. carota* L., *Dipsacus* sp., *Euphorbia characias* L., *Foeniculum vulgare* Mill., *Sambucus nigra* L. and *Vitis vinifera* L. were used as nesting sites.

Distribution: Austria, Balearic Is., Corsica, Czech Republic, France, Germany, Greece, Hungary, Italy, Luxembourg, Poland, Portugal, Russia, Sardinia, Sicily, Slovakia, Span, Sweden, Switzerland, Turkey Ukraine, Georgia, North Africa (Morocco, Tunisia) (Terzo, 1998). In Turkey: Adıyaman, Antalya, Aydın, Elazığ, Eskişehir, Gaziantep, Hatay, Muğla, Osmaniye, Şanlıurfa (Terzo *et al*., 1999; Terzo & Rasmont, 2011).

Ceratina (*Dalyatina*) *parvula* Smith, 1854

Synonyms: *Ceratina pygmaea* Lichtenstein, 1872; *Ceratina scintilla* Cockerell, 1931

Biology: According to Terzo *et al*. (1999), *C. parvula* occurred abundantly from sea level to 1000 m in the Çukurova region. Le Goff & Terzo (1999) studied the biology of *C. parvula* and noted that it is a bivoltine and polylectic species and visits the following plant species: *Lavandula latifolia* Med., *Rubus fruticosus* L., *Echium italicum* L., *E. plantagineum* L., *Aptenia cordifolia* (L.f.) Schwantes, *Convolvulus cantabrica* L., *Scabiosa columbaria* L., *Sisymbrium orientale* L., *Verbena officinalis* L., *Centaurea paniculata* L. and *Picris echioides* L. Terzo *et al*. (1999) recorded *Rubus* sp. as a nesting site in Çukurova. Mavromoistakis (1949) observed nesting in the stems of *Anchusa* sp., *Echium* sp. and *Asphodelus* sp.

Distribution: Canary Islands, all Mediterranean countries, including Egypt, Morocco, Tunisia, Jordan, Israel, Syria and Turkey; also in Turkmenistan (Kocourek, 1998; Terzo *et al*., 2007; Terzo & Rasmont, 2011). In Turkey: Adana, Antalya, Aydın, Gaziantep, Hatay, İzmir, Muğla, Osmaniye (Terzo *et al*., 1999; Terzo & Rasmont, 2011).

Remark: In the present study, no material was found related to *C. parvula*. However, Terzo *et al*. (1999) mentioned that it was the most abundant species after *C. mandibularis* in the Çukurova region.

Ceratina (*Euceratina*) *acuta* Friese, 1896

Material examined: Bilecik, Center, 600 m, 15.VI.1995, 1♂, leg. E. Yıldırım.

Biology: Terzo & Rasmont (2011) noted it is on the wing from April to the end of September with *Scabiosa atropurpurea* L., *Carduus acanthoides* L., *Echium vulgare* L., *Matricaria chamomilla* L., *Onopordum acanthium* L., *Robinia pseudoacacia* L., *Rubus caesius* L., *Salvia nemorosa* L., *Stachys recta* L., *Veronica teucrium* L. and *Convolvulus arvensis* L. recorded as the flowers visited.

Distribution: Albania, Armenia, Austria, Bulgaria, Crete, Croatia, Czech Republic, European Russia, Germany, Georgia, Greece, Hungary, Iran, Israel, Kazakhstan, Lebanon, Macedonia, Romania, Slovakia, Turkey, Turkmenistan, Ukraine (Terzo & Rasmont, 1997; Ascher & Pickering, 2014). In Turkey: Adana, Antalya, Bilecik, Burdur, Bursa, Erzincan, Hakkâri, İstanbul, Mersin, Osmaniye, Nevşehir, Kahramanmaraş, Kayseri, Isparta, Konya, Eskişehir, Hakkâri, Şırnak, Erzurum, Van (Terzo & Rasmont, 1997; Terzo & Rasmont, 2011).

Ceratina (*Euceratina*) *bifida* Friese, 1900

Material examined: Antalya, Düzlerçam, 200 m, 30.V.2004, 1♀ (on *Vitex agnus-castus*), leg. H. Özbek; Mersin, Erdemli, 20 m, 23.V.1992, 1♂, leg. H. Özbek.

Biology: It could be treated as a hemophilic and rare species in Turkey. Terzo *et al*. (1999) studied the *Ceratina* fauna of the Çukurova plain and collected 1140 specimens belonging to 12 species. Among them, *C. bifida* was represented by two samples collected at 100 m. Likewise, two samples in the present study

were collected at low altitudes (20-200 m). It was recorded visiting *Vitex agnus-castus*. Terzo *et al.* (1999) recorded the stem of *Rubus* sp. as a nesting site.

Distribution: It is an eastern Mediterranean species, with a narrow distribution range; Jordan, Israel, Lebanon, Syria, and Turkey (Terzo, 1998; Ascher & Pickering, 2014) In Turkey: Adana, Gaziantep, Hatay, Mersin (type locality), and Osmaniye (Terzo, 1998; Terzo *et al*., 1999).

Ceratina (*Euceratina*) *chalcites chalcites* Germar, 1839

Synonyms: *Ceratina aenea* Brullé, 1832; *C. egregia* Gerstäcker, 1869

Material examined: Ankara, Hacettepe University Campus, Beytepe, 920 m, 30.IX.1993, 1♀, leg. H. Özbek (on *Carduus acanthoides* L.); Erzincan, Horticultural Research Institute, 1200 m, 06.VII.1978, 1♀, leg. H. Özbek; Kemah, Gülkaymak, 1200 m, 1♂, 25.V.2001, leg. H. Özbek; Erzurum, Atatürk University Campus,1900 m, 18.VI.2000, 1♀, leg. M. Kesdek (on *Onobrychis viciifolia* Scop); 01.VII.1995, 1♀, leg. H. Özbek (on *Eryngium campestre* L.); 20.VII.1993, 1♀, leg. E. Yıldırım; 09.IX.1973, 1♀, leg. M. Doğanlar; Palandöken, 2200 m, 07.VI.1996, 2♀♀, leg. E. Yıldırım; Çat, Taşağıl, 2100 m, 11.VII.2002, 1♂, leg. Ö. Çalmaşur; İspir, 1050 m, 19.VI.1971, 1♂, leg. H. Özbek; Narman, 1500 m, 27.VI.1997, 1♀, leg. E. Kılıç; Oltu, Çamlıbel, 1550 m, 08.VII.2007, 1♀, leg. J. S. Ascher, H. Özbek, J. G. Rozen (deposited in AMNH); Şenkaya, Paşalı, 03.VIII.1991, 1♀, leg. E. Yıldırım; Timur Kışla, 04.VII.1998, 2♀♀, leg. H. Özbek; Tortum, Aksu, 1500 m, 10.IX.1993, 1♂, 2♀♀, leg. G. Tozlu; Kars, Arpaçay, Küçükpirveli, 1800 m, 1♀, leg. C. Güçlü; Sarıkamış, Karakurt, 1500 m, 25.VIII.2002, 1♀, leg. H. Özbek (Malaise trap).

Biology: It lives in a wide variety of habitats; samples were collected at altitudes between sea level (Adana) and 2200 m or more (Erzurum). Flight season from May to the end of September, peak flight occurs in July. Flower visited: *Carduus acanthoides, E. campestre* and *O. viciifolia*. Özbek (2011) listed *C. chalcites* as a pollinator of *O. viciifolia* in Erzurum. Terzo & Rasmont (2011) indicated it is a highly polylectic species, visiting various plant species in different families such as Apiaceae, Boraginaceae, Campanulaceae, Dipsacaceae, Euphorbiaceae, Lamiaceae, Liliaceae, Malvaceae and Oleaceae.

Distribution: In northern and eastern Mediterranean countries, including European Russia and all the main Mediterranean islands except Corsica and Sicily, to the East reaching the Caucasus and eastern Turkey, northern Iran and Turkmenistan, absent in Africa (Terzo, 1988; Ascher & Pickering, 2014). In Turkey: Adana, Ankara, Aydın, Çankırı, Edirne, Erzurum, Istanbul, İzmir, Kahramanmaraş, Niğde, Osmaniye, Van (Terzo & Rasmont, 2011).

Ceratina (*Euceratina*) *chalcites ebmeri* Terzo, 1998

Terzo (1998) described this subspecies from Hakkâri. He noted that it is endemic to and abundant in Hakkâri, occurring at 1500-2500 m a.s.l. Samples were collected in June and July.

Ceratina (*Euceratina*) *chalybea* Chevrier, 1872

Synonyms: *Ceratina hungarica* Mocsáry, 1879; *C. callosa algeriensis* Friese, 1896; *C. callosa cephalica* Cockerell, 1931

Material examined: Artvin, Ardanuç, Ferhatlı, 600 m, 03.V.2008, 1♂, leg. Ö. Çalmaşur (on *Echium plantagineum* L.); Yusufeli, Cinnar, 900 m, 15.VII.1992, 1♀, leg. E. Yıldırım; Yusufeli, 550 m, 18.VIII.1983, 1♀, leg. G. Tozlu; Erzurum, Atatürk University Campus, 1900 m, 19.VII.1993, 1♀, leg. E. Yıldırım (on *Eryngium creticum* Lam.); 15.VIII.1993, 1♀, leg. E. Yıldırım; Olur, Coşkunlar, 1100 m, 12.VII.1991, 2♀♀, leg. E. Yıldırım; Şenkaya, Akşar, 1300 m, 16.VII.1994, 1♀, leg. E. Yıldırım; Iğdır, Center, 900 m, 25.V.1971, 1♀, leg. H. Özbek; Konya, Güneysınır, Gürağaç, 1020 m, 06.VIII.2002, 1♀, leg. M. Kesdek; Muş, Buğlan geçidi,

2200 m, 23.VII.2003, 1♀, leg. H. Özbek; Osmaniye, Amanus Mountain, 1800 m., 24.V.1992, 1♂, leg. H. Özbek.

Biology: It could be treated as an open area species, but certain samples were collected in semi-open biotopes with shrubs, steppes and forest margins at altitudes between 550-2200 m. Similarly, Terzo *et al*. (1999) collected samples of *C. chalybea* at 1000-1099 m a.s.l. on the Çukurova plain. Flight season from May to August, peak flight is in July; visits *Echium plantagineum* and *Eryngium creticum*. Terzo & Rasmont (2011) noted that it is a polylectic species. As a nesting site, it uses *Rubus* sp. It is a widespread species in the country.

Distribution: Portugal, France, Switzerland, Germany, Bosnia and Herzegovina, Sicily, Slovakia, Macedonia, Greece, European Russia, Ukraine, Georgia, Turkey, Armenia, Jordan, North Africa (Algeria, Morocco, Tunisia) (Terzo *et al*., 1999; Ascher & Pickering, 2014). In Turkey: Adana, Bolu, Bursa, Çankırı, Denizli, Erzurum, Hakkâri, Kars, Kastamonu, Kayseri, Mersin, Şırnak, and Van (Terzo *et al*., 1999; Terzo & Rasmont, 2011).

Ceratina (*Euceratina*) *christellae* Terzo, 1998

Distribution: It has narrow distribution range: Azerbaijan, Iran and Turkey (Terzo, 1998). In Turkey: Antalya, Hakkâri (Terzo, 1998).

Remark: Terzo (1998) described *C. christellae* from Antalya. In the present study, no material was found, even in the type locality (Antalya).

Ceratina (*Euceratina*) *chrysomella* Gerstäcker, 1869

Material examined: Adana, Center, 35 m, 25.VII.1990, 1♂, leg. E. Yağlı; Çukurova University Campus, Balcalı, 100 m, 25.V.1992, 1♀, leg. E. Yıldırım.

Biology: All samples were collected around sea level (Adana) in May and July. Similarly, Terzo *et al.* (1999) collected *C. chrysomella* samples at 0-300 m a.s.l. on the Çukurova plain. However, it was recorded at higher altitudes, such as Hakkâri (Terzo, 1998). According to Terzo & Rasmont (2011), it is a univoltine species, on the wing from April to August, peak flight in May and June. Mavromoustakis (1949) observed visiting of the following plant species in Cyprus: *Anchusa* sp., *Centaurea hyalolepis* Boiss., *Inula viscosa* Ait., *Malva sylvestris* L., *Rubus ulmifolius anatolicus* Focke, *Salvia* sp., *Sinapis alba* L. Terzo *et al*. (1999) observed stems of *Rubus* sp. as nesting sites.

Distribution: Bulgaria, Greece, Romania, Crete, Cyprus, Armenia, Azerbaijan, Syria, Turkey, Ukraine (Terzo, 1998; Terzo & Rasmont, 2011; Ascher & Pickering, 2014). In Turkey: Adana, Antalya, Gaziantep, Hakkâri, Hatay, İzmir, Kayseri, Kahramanmaraş, Mardin, Mersin, Muğla, Ordu, Osmaniye (Terzo, 1998; Terzo & Rasmont, 2011).

Ceratina (*Euceratina*) *cyanea* (Kirby, 1802)

Material examined: Artvin, Yusufeli, Altıparmak, 1300 m, 05.VII.1994, 1♀, leg. E. Yıldırım; 2-8 km SW Altıparmak, 1350 m, 25-27.VII.2006, 1♂ (on *Carduus nutans* L.), leg. H. Özbek; Erzincan, Bahçeli, 09.VIII.1990, 1♀, leg. E. Yıldırım; Erzurum, Horasan, Aras Valley, 1600 m, 04.VI.2000, 1♂, 1♀, leg. E. Yıldırım; Olur, Yeşilbağlar, 1000 m, 16.VI.2000, 1♀, leg. Ö. Çalmaşur; Pasinler, 1600 m, 25.VII.1977, 1♀ (on *Carduus acanthoides* L.), leg. H. Özbek; Şenkaya, Turnalı, 1700 m, 06.VII.1990, 1♀, leg. E. Yıldırım; Uzundere, Şelale, 1000 m, 09.VI.1996, 1♂, leg. E. Yıldırım. Iğdır, Agricultural Research Station, 900 m, 31.VII.2002, 2 ♂♂, leg. M. Kesdek (on *Centaurea solstitialis*). Kars, Sarıkamış, 1800 m, 26.VIII.1991, 1♂, leg. E. Yıldırım.

Biology: Terzo & Rasmont (2011) treated it as a univoltine species, active from May to July. In the present, study material was collected mainly in July and August at altitudes from 900 to 1800 m a.s.l. on *C. acanthoides, C. nutans* and *C. solstitialis* in the eastern and northeastern parts of Anatolia. Similarly, Terzo & Rasmont (2011) indicated that it occurs up to 2250 m a.s.l. as a very polylectic species, mainly nesting in the stems of *Rubus* sp.; they also observed nesting in the stems of *Sambucus* sp., *Euphorbia characias* L. and *Vitis vinifera*.

Distribution: Almost the whole of Europe including European Russia; North Africa (Algeria); Azerbaijan, Georgia, Kazakhstan, Turkey, Turkmenistan (Terzo & Rasmont, 2011; Ascher & Pickering, 2014). In Turkey: Aksaray, Ardahan, Artvin, Erzurum, Çankırı, Eskişehir, Hakkâri, Konya, Niğde, Şanlıurfa (Terzo & Rasmont, 2011).

Ceratina (*Euceratina*) *dallatorreana* Friese, 1896

Biology: In the present study, no material was found related to *C. dallatorreana*. According to Terzo & Rasmont (2011), it is a univoltine species, with peak flight occurring in July. They listed the following plant species as visiting plants: *Eryngium campestre*, *Hedera helix* L., *Carduus tenuiflorus* Curt., *Centaurea solstitialis* L., *Echinops* sp., *Onopordum macracanthum* Schbousboe, *Echium plantagineum* L., *E. vulgare* L., *Trifolium pratense* L. and *Ziziphus lotus* (L.) Lam.

Distribution: All Mediterranean countries including North Africa (Morocco, Tunisia); European Russia, Georgia, Kyrgyzstan, Lebanon, Turkey, Turkmenistan, Uzbekistan (Daly, 1966; Terzo & Rasmont, 2011; Ascher & Pickering, 2014). In Turkey: Adana, Antalya, Aydın, Burdur, Bursa, Erzincan, Gaziantep, Hatay, Isparta, İstanbul, Kahramanmaraş, Kayseri, Mersin, Osmaniye, Samsun (Terzo & Rasmont, 2011).

Ceratina (*Euceratina*) *denesi* Terzo, 1998

Material examined: Antalya, Arapsuyu, Azmak, 10 m, 30.VI.2002, 1♀, leg. H. Özbek [on *Mentha longifolia* (L.) Hudson].

Biology: It is a thermophilic species. *M. longifolia* was first detected as a visiting plant.

Remark: *C. denesi* was described from Mersin (Silifke) by Terzo (1998) with one male. In the present study, a female was found in Antalya, which is the first recorded location after the type locality. These data revealed that *C. denesi* may occur along the Mediterranean border of southern Anatolia. Currently, it is endemic to Turkey.

Ceratina (*Euceratina*) *dentiventris* Gerstäcker, 1869

Material examined: Ankara, Şereflikoçhisar, 965 m, 30.VII.2008, 1♂, leg. C. Güçlü; Bilecik, Center, 600 m, 15.VI.1995, 3♀♀, leg. E. Yıldırım; Erzincan, Muti köprüsü, 1300 m, 16.IX.1979, 2♂♂, leg. H. Özbek (on *E. campestre*); Kayseri, Yenihisar, Araplı, 1100 m, 07.IX.1987, 1♂, leg. H. Özbek (on *Stachys annua* L.); Mersin, Silifke, 20 m, 22.VI.1978, 1♀, leg. H. Özbek (on *Eryngium campestre*).

Biology: The present study showed that it is an open area species, occurring from sea level to 1300 m, on wing from June to the end of September, and visits *E. campestre* and *S. annua*. Terzo & Rasmont (2011) noted that it is a polylectic and univoltine species. In the present study, it was recorded from Mersin, but Terzo *et al*. (1999) did not find it in Mersin. Additionally, it was first recorded from the Marmara region (Bilecik).

Distribution: All northern Mediterranean countries, including the main Mediterranean islands, except the Balearic Islands and Cyprus, reaching southern Romania. It is present in Lebanon, Syria and Israel and in North Africa (in Tunisia only) (Terzo, 1998). In Turkey: Adana, Aydın, Gaziantep, Hakkâri, Şanlıurfa (Terzo &

Rasmont, 2011).

Ceratina (*Euceratina*) *gravidula* Gerstäcker, 1869

Material examined: Artvin, Yusufeli, Demirkapı, 600 m., 14.VIII.1991, 1♀, leg. H. Özbek (on *Carduus acanthoides* L.); Taşkıran, 1350 m, 06.VII.2003, 1♀, leg. İ. Aslan; Zebzeciler, 400 m, 14.VIII:1991, 1♀, leg. E. Yıldırım; Erzurum, Oltu, Anzav deresi, 1200 m, 05.VII.1995, 1♀, leg. İ. Aslan (on *Eryngium campestre*).

Biology: Samples were collected mainly in semi-open biotopes with shrubs, steppes and margins of wooded areas in July and August. Similarly, Terzo & Rasmont (2011) noted that it is a univoltine species and abundant in July. *C. acanthoides* and *E. campestre* were recorded as visiting plants. Terzo & Rasmont (2011) listed the following plant species: *Catananche caerulea* L., *Centaurea aspera* L., *C. collina* L., *C. jacea* L., *C. paniculata*, *C. solsitialis*, *Hieracium pilosella* L., *Echium* sp., *Scabiosa atropurpurea* L., *Lavandula angustifolia* Mill., *Potentilla* sp. and *Rubus* sp. It was first recorded from the northeastern part of the country (Artvin and Erzurum provinces). Present and previous records showed that *C. gravidula* occurs from sea level to 1500 m.

Distribution: Spain, France, Germany, Moravia, Sicily, Romania, Greece, Georgia, Turkey, Ukraine, (Terzo & Rasmont, 1996; Ascher & Pickering, 2014). In Turkey: Amasya, Aydın, Bursa, İzmir, Kars, Muğla (Terzo & Rasmont, 1996).

Ceratina (*Euceratina*) *hakkarica* Kocourek, 1998

Remark: Kocourek (1998) described *C. hakkarica* from Hakkâri. Kocourek's records revealed that it is quite abundant in Hakkâri and a mountainous species occurs at 1200-2600 m a.s.l. Terzo & Rasmont (2011) added records of 14 samples from Kahramanmaraş. It is endemic to Turkey; no material was found in the present study.

Ceratina (*Euceratina*) *loewi* Gerstäcker, 1869

Material examined: Antalya, Beydağları, Saklıkent Road, Âlim pınarı, 900 m, 09.VII.1991, 1♀ (on *Mentha longifolia*), leg. H. Özbek. Aydın: İncirova, 05.VII.1997, 1♂, 1♀, leg. H. Özbek. Muğla, Yatağan, 04.V.2004, 1♀, leg. G. Tozlu.

Biology: It is lowland and high thermophilic bee species, but Terzo & Rasmont (2011) indicated that it occurs at altitudes up to 1500 m. In the present study, it was collected as high as 900 m. Its flight season is March to November. In addition to the abovementioned *M. longifolia*, Terzo & Rasmont (2011) listed *Carthamus* sp., *Echium angustifolium* Mill. and *Sinapis arvensis* L. as visiting plants. Stems of *Rubus* sp. were observed as nesting sites.

Distribution: Bulgaria, Greece (including Crete), Jordan, Israel, Syria, Turkey, West Bank (Friese, 1901; Terzo, 1998; Terzo & Rasmont, 2011). In Turkey: Adana, Antalya Aydın, Balıkesir, Bilecik, Burdur, Bursa, Çanakkale, Denizli, Hatay, İzmir, Karaman, Kayseri, Mersin, Muğla (type locality), Niğde, Osmaniye, Sakarya (Friese, 1901; Terzo & Rasmont, 2011). It should be emphasized that *C. loewi* was probably the first *Ceratina* species described from Turkey (Muğla).

Ceratina (*Euceratina*) *mandibularis* Friese, 1896

Material examined: Adana, Balcalı, Çukurova University Campus, 90 m, 25.V.1992, 1♀, leg. E. Yıldırım; Ceyhan, 20 m, 22.V.1992, 1♀, leg. H. Özbek; Mersin, Silifke, 50 m, 22.VI.1978, 3♂♂, 2♀♀, leg. H. Özbek (on *Eryngium creticum)* 30 m, 20.VIII.1987, 1♂, 1♀, leg. H. Özbek; Cyprus: Dipkarpuz, Altınkum, 22.VII.2005, 1♀, leg. H. Özbek.

Biology: In general, it is a lowland species. Terzo *et al*. (1999) found *C. mandibularis* to be the most abundant species on the Çukurova plain of Turkey. They collected a total of 1140 samples, of which about 60% were *C. mandibularis*. It was recorded from sea level to 1100 m, but it was most abundant at the altitudes of 0-99 m. Similarly, in the present study, samples were collected in the Adana and Mersin provinces at altitudes of 20-90 m. Terzo & Rasmont (2011) noted that it has a long flying period, and therefore has two generations, and the stems of *Rubus* sp. were used as nesting sites. In addition to the above mentioned *E. creticum,* Mavromoustakis (1949) listed the following species as visiting plants: *Ballota nigra* L., *Inula crithmoides* L., *Lotus* sp., *M. longifolia* Huds. and *Rubus ulmifolius anatolicus* Focke.

Distribution: Eastern Mediterranean (Cyprus, Egypt, Israel, Jordan, Lebanon, Syria, Turkey and West Bank) (Terzo, 1998; Terzo & Rasmont, 2011). In Turkey: Adana, Antalya, Denizli, Diyarbakir, Hatay, Gaziantep, Kayseri, Kilis, Mersin, Osmaniye (Terzo, 1998; Terzo & Rasmont, 2011).

Ceratina (*Euceratina*) *moricei* Friese, 1899

Material examined: Antalya, Side, 10 m, 02.IX.1970, 1♀, leg. M. Doğanlar (on *Centaurea solstitialis*); Mersin, Silifke, 30 m, 22.VII.1978, 1♂, leg. H. Özbek (on *Eryngium creticum*); Boğusak, 4 m, 02.IX.1987, 1♀, leg. H. Özbek (on *Heliotropium europaeum* L.).

Biology: All the samples were collected at sea level, in Antalya and Mersin on *E. creticum* and *C. solstitialis* and *H. europaeum*. Mavromoustakis (1949) recorded it on *R. ulmifolius anatolicus*, *Centaurea sp.* Boiss., *E. creticum*, *Statice* sp., and *Lotus* sp. Terzo *et al*. (1999) noted that *C. moricei* is the second most abundant species after *C. mandibularis* on the Çukurova plain, but it is very rare above 700 m.

Distribution: Eastern Mediterranean (Cyprus, Jordan, Israel, Lebanon, Turkey). In Turkey: Adana, Antalya (type locality), Gaziantep, Hatay, Kilis, Mardin, Mersin, Osmaniye, Muğla, Nevşehir, (Terzo, 1998; Terzo & Rasmont, 2011).

Remark: *C. moricei* was described from Turkey (Antalya) (Friese, 1899). Probably this is the second *Ceratina* species described from Turkey after *C. loewi*.

Ceratina (*Euceratina*) *neocallosa* Daly, 1983

Distribution: It has a narrow distribution range: Egypt, Jordan, Israel, Saudi Arabia, Syria, Turkey (Terzo & Rasmont, 2011). *Ceratina neocallosa* is a very rare species in Turkey, known from Nevşehir with only a single specimen (Göreme) (Terzo & Rasmont, 2011).

Ceratina (Euceratina) nigroaenea Gerstäcker, 1869

Material examined: Adana, Center, 25 m, 10.IX.1974, 1♂, 2♀♀, leg. M. Doğanlar; Erzincan, Horticultural Research Institute, 1250 m, 07.VII.1993, 1♀, leg. E. Yıldırım (on *Echium vulgare*); Mersin, Silifke, 40 m, 20.VII.1987, 1♀, leg. H. Özbek (on *Eryngium creticum*).

Biology: Present records and literature sources revealed that *C. nigroaenea* occurs from sea level to 2000 m all over the country. Terzo *et al*. (1999) carried out a special study on the *Ceratina* fauna of the Çukurova region and found just one sample at 0-99 m a.s.l. in Adana. In the present study, three samples were collected at 25 m a.s.l. in Adana. It is a univoltine species, on wing from April-September, with peak flying in July (Terzo & Rasmont, 1999). *E. vulgare* and *E. creticum* were recorded as visited flowers, and Terzo & Rasmont (1999) listed the following species: *Centaurea calcitrapa* L., *C. solstitialis*, *Onopordum* sp., *Stachys* sp. and *Ailanthus* sp. They also recorded the stems of *Rubus* sp. as nesting sites.

Distribution: It has a narrow distribution range; Azerbaijan, Greece, Georgia, Israel, Turkey (Terzo & Rasmont, 1996). In Turkey: Amasya, Aydın, Bursa, Kars, Muğla, Samsun (Friese, 1901); Antalya, Erzurum,

Gaziantep, Hatay, İzmir, Karaman, Mardin, Muğla, Osmaniye (Terzo & Rasmont, 1996).

Ceratina (*Euceratina*) *nigrolabiata* Friese, 1896

Material examined: Ankara, Şereflikoçhisar, 965 m, 30.VII.2008, 1♀, leg. C. Güçlü; Artvin, Yusufeli, 600 m, 04.V.1978, 2 ♂♂, leg. H. Özbek (on *Carduus acanthoides*); 18.VII.1993, 1♂, leg. G. Tozlu; 15.VIII.1991, 1♀, leg. E. Yıldırım; Cinnar, 900 m, 15.VII.1992, 1♂, leg. E. Yıldırım; İşhan, 14.VIII.1991, 1♀, leg. E. Yıldırım; 17.IX.1978, 1♀, leg. H. Özbek; Kınalıçam, 600 m, 04.V.1978, 1♀, leg. H. Özbek (on *Sinapis arvensis* L.); Zebzeciler, 400 m, 15.VIII.1991, 2♀♀, leg. E. Yıldırım; Erzincan, Horticultural Research Institute, 07.VII.1993, 1♀, leg. E. Yıldırım; Üzümlü, 1400 m, 24.VI.2004, 1♂, leg. S. Çoruh (on *E. campestre)*; 02.IX.1993, 2♂♂, leg. G. Tozlu (on *Centaurea solstitialis*); Muti köprüsü, 16.IX.1979, 1♀, leg. H. Özbek; Erzurum, Atatürk University Campus, 1900 m, 18.VII.1970, 1♀, leg. H. Özbek; İspir, 17.VII.1992, 1♀, leg. E. Yıldırım; Kan, 1100 m, 20.VIII.1970, 1♂, leg. H. Özbek (on *C. acanthoides*); Oltu; İriağaç, 08.VIII.2000, 1♀, leg. H. Özbek; Tortum, Yedigöller, 1600 m, 19.V.2005, 2♂♂, leg. S. Çoruh (on *Stachys* sp.); Iğdır, Center, 900 m, 25.V.1971, 1♀, leg. H. Özbek; Kars, Sarıkamış, Karakurt, 1500 m, 25.VIII.1997, 1♀, leg. E. Yıldırım.

Biology: A widespread species occurring almost all over the country from 400 m to about 2000 m a.s.l. It has a long flying season; samples were collected from May to mid-September, flight peak occurs in July and August. Because of the long flying period, it could be a bivoltine species; however, Terzo & Rasmont (2011) recorded it as univoltine. Apart from the abovementioned plant species, *D. carota*, *E. campestre*, *Centaurea* sp., *Echinops rirtro* L., *S. arvensis*, *S. atropurpurea*, *Malva* sp. and *Linaria* sp. were listed by Terzo & Rasmont (2011) as visiting plants.

Distribution: South and Central Europe from Portugal to Greece, including European Russia; Azerbaijan, Georgia, Syria, Turkey (Terzo & Rasmont, 2011; Ascher & Pickering, 2014). In Turkey: Adıyaman, Ankara, Antalya, Ardahan, Aydın, Burdur, Çankırı, Çorum, Erzincan, Erzurum, Hakkâri, Isparta, İzmir, Kahramanmaraş, Karaman, Kars, Kayseri, Konya, Muğla, Nevşehir, Niğde (Terzo & Rasmont, 2011).

Ceratina (*Euceratina*) *rasmonti* Terzo, 1998

Remark: *C. rasmonti* was described from Van by Terzo (1998), present in Ağrı as well. Since then, no material has been found; total specimens comprise 4 females.

Ceratina (*Euceratina*) *sakagamii* Terzo, 1998

Biology: This species was described from Kars (Terzo, 1998). Although no material was found in the present study it is quite widespread in the country. Terzo's (1998) records showed that *C. sakagamii* occurs from the steppe area in Central Anatolia to the mountainous eastern part of the country up to 2000 m a.s.l. Terzo & Rasmont (2011) noted that it is univoltine and occurs up to 2500 m.

Distribution: It has a narrow distribution range: Greece, Iran, Turkey (Terzo, 1998). In Turkey: Ağrı, Hakkâri, Kars (type locality), Konya, Mersin, Nevşehir, Niğde, Van (Terzo, 1998).

Ceratina (*Euceratina*) *schwarziana* Terzo, 1998

Material examined: Kars, Sarıkamış, Karakurt, 1500 m, 07-19.VI.2007. 1♀, leg. H. Özbek (Malaise trap).

Remark: *C. schwarziana* was described from Hakkâri by Terzo (1998). The present study added Kars province to the distribution range. It could be treated as a mountainous species, occurring from 1500-2000 m. Based on current knowledge, it could be treated as an endemic species for Turkey.

Ceratina (*Euceratina*) *tibialis* Morawitz, 1895

Synonym: *Ceratina ahngeri* Kokujev, 1905

Material examined: Adıyaman, Fidanlık, 800 m, 11.V.2002, 1♀, leg. H. Özbek; Diyarbakır, Pirinçlik, road side, 700 m, 2♀♀, 07.V.2002, leg. H. Özbek (on *C. solstitialis*).

Biology: Present and previous records revealed that *Ceratina tibialis* occurs in the southern part of the country, below 900 m, mainly in open areas. However, Terzo & Rasmont (2011) noted that it occurs up to 2000 m. They also indicated that it is univoltine, peak flying for females in June, for males in May to July. In the present study, *C. solstitialis* was recorded as a visiting plant. Popov (1967) listed the following plant species: *Eryngium planum* L., *V. officinalis, Centaurea calcitrapa* L., *C. iberica* Trev. Ex Spreng., *C. solstitialis*, *Pulicaria salviaefolia* Bunge, *E. italicum*, *Heliotropium* sp., *Cercis siliquastrum* L., *Hyssopus officinalis* L., *Salvia officinalis* L.

Distribution: Azerbaijan, Iran, Israel, Syria, Tajikistan, Turkey, Turkmenistan (Terzo, 1998). In Turkey: Adana, Dıyarbakır, Gaziantep, Hatay, Mersin, Şanlıurfa (Terzo & Rasmont, 2011).

Ceratina (*Euceratina*) *warnckei* Terzo, 1998

Remark: *C. warnckei* was described from Hakkâri by Terzo (1998) on the basis of material collected by K. Warncke (except for one sample collected in Kahramanmaraş by A. Ebmer) in June-August of the 1970s and 1980s (total 15 samples). It was recorded from Kahramanmaraş and Şırnak as well. Since then, no material has been found. Collecting localities showed that *C. warnckei* is a mountainous species and generally occurs above 1500 m. Currently it is an Anatolian endemic species.

Ceratina (*Euceratina*) *zwakhalsi* Terzo & Rasmont, 1997

Material examined: Erzurum, Çat, Taşağıl, 2000 m, 11.VII.2002, 1♂, leg. Ö. Çalmaşur (on *Centaurea solstitialis*); Oltu, Başaklı, 1600 m, 25.VI.1970, ♂, leg. H. Özbek; Güryaprak, 1900 m, 30.VIII.1990, 1♂, 1♀, leg. İ. Aslan (on *Eryngium campestre*); Tortum, Aksu, 1500 m, 30.IX.1993, 2♀♀, leg. İ. Aslan.

Biology: Present and previous records show that *C. zwakhalsi* is widespread in Turkey, occurring from 1000-2500 m or more in various habitats. It is a mountain species; active from April to the end of September. Terzo & Rasmont (2011) recorded it as a univoltine species with peak flying in June for males, June and July for females. It visits *C. solstitialis* and *E. campestre*: additionally, Terzo & Rasmont, (2011) listed the following species: *Eryngium* sp., *Rhaponticum repens* (L.) Hidalgo, *Centaurea sterophylla* Bess., *Senecio jacobaea* L., *Tragopogon ruthenicus* Bess. Ex Claus, *Convolvulus arvensis* L., *Allium angulosum* L., *Dodartia orientalis* L., *Linaria vulgaris* Mill.

Distribution: Greece, Azerbaijan, Georgia, Iran, Kazakhstan, Lebanon, Russia, Turkey and Turkmenistan. In Turkey: Ağrı, Bitlis, Elazığ, Erzincan, Hakkâri (type locality), Kahramanmaraş, Kars, Muş, Niğde, Siirt, Sivas, Şırnak and Van (Terzo & Rasmont, 1997). It is new record for Erzurum and is quite common in this area.

Ceratina (*Neoceratina*) *bispinosa* Handlirsch, 1889

Material examined: Adıyaman, 8 km E of Adıyaman, 11.V.2002, 1♂, 1♀, leg. J. G. Rozen and H. Özbek. Diyarbakır, Prinçlik, 700 m, 09.V.2002, ♀, leg. J. G. Rozen and H. Özbek (on *Trifolium* sp.); Osmaniye, 6 km W of Hassa, 850 m, 13.V.2002, 1♀, leg. J. G. Rozen and H. Özbek; Şanlıurfa, 10 km SE of Bozova, 10.V.2002, 1♂, leg. J. G. Rozen and H. Özbek (in AMNH); Bozova, 525 m, 22.VII.1993, 2♀♀, leg. A. Akkaya (on *annuum* L.) (one sample deposited in M. Terzo 's collection).

Biology: In the present study, all samples were collected in the warmer part of the country (southeastern

Anatolia and Çukurova) below 850 m. Additionally, Terzo *et al*. (1999) recorded it on the Çukurova plain at lower altitudes (below 200 m). Terzo & Rasmont (2011) noted that it is a thermophilic species, active from March to October with peak flying in April and May for both sexes. In the present study, *C. annuum* (pepper) and *Trifolium* sp. were detected as visiting plants. The visiting of *C. annuum* by *C. bispinosa* is very important, because this plant is one the most important vegetable crops in the country. We think that as a pollinator of *C. annuum*, further studies should be conducted on *C. bispinosa* in the region. Terzo & Rasmont (2011) noted stems of *Rubus* sp. as a nesting site, and Mavromoistakis (1949) observed nests in the stems of *Anchusa* sp., *Echium* sp. and *Asphodelus* sp.

Distribution: Croatia, Crete, Cyprus, Jordan, Israel, Syria, Turkey (Kocourek, 1998; Terzo *et al.*, 1999). In Turkey: Adana, Antalya, Aydın, Hakkari, Hatay, İstanbul, İzmir Mersin, Muğla and Osmaniye (Kocourek, 1998; Terzo *et al.*, 1999; Terzo & Rasmont, 2011).

Ceratina (*Neoceratina*) *schwarzi* Kocourek, 1998

Distribution: Bulgaria, Cyprus, Greece, Macedonia, Montenegro, Italy, Romania, Jordan, Iran, Turkey (Terzo, 1998). In Turkey: Adana, Aydın, Bilecik, Elazığ, Gaziantep, Hakkâri (type locality), Hatay, Kahramanmaraş, Karaman, Konya, Malatya, Mardin, Mersin, Muğla, Nevşehir, Sivas, Şanlıurfa (Kocourek, 1998; Terzo, 1998; Terzo *et al*., 1999).

Remark: In the present study, no sample of *C. schwarzi* was collected. However, previous records showed this species to be widespread in Turkey, recorded in almost all geographic regions from sea level to 1000 m or more, except for northeastern Anatolia. On the Çukurova plain it is the second most abundant species, below 300 m (Terzo *et al*., 1999).

Tribe: Allodapini

Genus: *Exoneuridia* Cockerell, 1911

Exoneuridia, the only genus of Allodapini bee occurring in the Western Palearctic region and it is endemic to this region (Terzo, 1999). Warncke (1983) described *Allodape libanensis hakkariensis* from Hakkâri. Later the genus *Exoneuridia* was revised by Terzo (1999) and three species were recognized: *Exoneuridia libanensis* (Friese, 1899), *E. oriola* (Warncke, 1979) and *E. hakkariensis* (Warncke, 1983). Among them *E. hakkariensis* is the only species that occurs in Turkey.

Exoneuridia hakkariensis (Warncke, 1983)

Synonym: *Allodape libanensis hakkariensis* Warncke, 1983

Material examined: Şanlıurfa, Bozova, 525 m, 22.VII.1993, 2♀♀, leg. A. Akkaya (on *Capsicum annuum*) (deposited in the collection of M. Terzo); Tunceli, Ovacık, Gözeler, 2200 m, 14.VII.1984, 1♂, 6♀♀, leg. H. Özbek (on *Carduus* sp.); Van, Erciş, 1700 m, 27.VII.1978, 2♀♀, leg. H. Özbek (on *Carduus* sp.).

Biology: The present study added three provinces, Şanlıurfa, Tunceli and Van, to the distribution range of *E. hakkariensis*. Currently, *E. hakkariensis* occurs in 10 provinces, mainly in eastern and southeastern parts of the country (Fig. 1). Samples were collected on *Carduus* sp. and *Capsicum annuum*. The visiting of the flowers of *C. annuum*, which is an important vegetable crop growing in the region, is significant. It could be an efficient pollinator of this plant, so further sutdies should be conducted.

Remark: Terzo (1999) listed the following provinces in the distribution range of this species: Hakkâri (type locality), Bitlis, Kahramanmaraş, Mardin, Siirt, Sivas and Şırnak.

Discussion

The present paper revealed that currently the tribe Ceratinini includes 27 species and two subspecies, while the tribe Allodapini is represented by only one species in Turkey. The genus *Ceratina* has 357 described species worldwide, and that of *Exoneuridia* three (Ascher & Pickering, 2014). Roughly 10% of the world's *Ceratina* and one third of *Exoneuridia* species occur in Turkey.

Ceratina dallatorreana, C. parvula, C. dallatorreana, C. sakagamii and *C. schwarzi* are widespread species in the country (Terzo, 1998; Terzo & Rasmont, 2011); however, no samples were collected during the present study. This is probably because *Ceratina* species are small and discrete and more easily sampled by collecting their nests in winter or early spring (as Terzo did in his previous studies) than by net. Previous and present records show that *C. cucurbitina*, C. *chalcites*, *C. chalybea*, *C. chrysomella*, *C. cyanea*, *C. loewi* and *C. gravidula* are also common species and have different distribution ranges. *Ceratina cucurbitina* and C. *chalcites* were recorded from sea level to 1500-2200 m in all geographic regions, except the Black Sea region. *Ceratina chrysomella* is abundant in the Mediterranean region, *C. loewi* is highly distributed in the east Mediterranean and Aegean regions, and *C. cyanea* is distributed mainly in the eastern part of Turkey. Although Terzo & Rasmont (2011) indicated that *C. dentiventris* was rare in Turkey; in the present study it was recorded from Ankara, Bilecik, Erzincan, Kayseri and Mersin: thus it could be treated as a common or moderately distributed species. Similarly, *C. gravidula* could be treated as a moderately distributed species, because Terzo & Rasmont (2011) recorded its presence in several provinces in various geographic regions. All *C. mandibularis* samples were collected from the Adana and Mersin provinces only. Similarly, Terzo (1998) noted that *C. mandibularis* was the most numerous species on the Çukurova plain. In the present study *C. moricei* was collected from Antalya only. According to Terzo *et al.* (1999), *C. moricei* was the second most abundant species after *C. mandibularis* on the Çukurova plain and very rare above 1000 m. *Ceratina bispinosa* was recorded along the Mediterranean costal region by Kocourek (1998) and Terzo *et al*. (1999). However, in the present study it was recorded from southeastern Anatolia, Adıyaman, Diyarbakır and Şanlıurfa provinces.

On the other hand, certain Turkish *Ceratina* species are very rare (Fig. 1): *C. christellae* has been known from Antalya and Hakkâri only (Terzo, 1998). Since the description of *C. hakkarica* from Hakkâri (Kocourek, 1998), no material has been found. Kocourek's records revealed that it was numerous in Hakkâri province and occurred at altitudes 1200-2600 m a.s.l. Similarly, *C. neocallosa* is known from Nevşehir only as a single sample (Terzo & Rasmont, 2011); those of *C. rasmonti* from Ağrı and Van and *C. warnckei* from Hakkâri, Kahramanmaraş and Şırnak (Terzo, 1998). It should be mentioned that *C. schwarziana* was described from Hakkâri (Terzo, 1998); the present study added Kars Province to its distribution range (Fig. 1). Regarding *C. tibialis,* Terzo & Rasmont (2011) noted that it is a rare species, recording only a few samples in Çukurova and southeastern Anatolia. However, in the present study additional samples were collected from the Adıyaman and Diyarbakır provinces.

Concerning to the tribe Allodapini, it is represented by *Exoneuridia hakkariensis,* which is the only species occurring in Turkey, and in the Palearctic Region (Terzo, 1999). Previous and present records revealed that this unique endemic species has been recorded in 10 provinces in eastern, central and southeastern Anatolia (Fig. 1), and so far, 51 specimens have been collected.

From a zoogeographical point of view, like most of the other bee species, Turkish *Ceratina* bees are concentrated in the Mediterranean basin. Therefore, the majority of Turkish *Ceratina* bees comprise elements from Europe and North Africa, but mainly southern Europe. Thus, six species, *C. cucurbitina, C. parvula, C.*

chalybea, C. cyanea, C. dallatorreana and *C. dentiventris*, occur in three continents, Europe, Asia and Africa. Daly (1966) noted that *C. dallatorreana* was introduced to California from the Mediterranean region. The remaining species have Palearctic distribution. Two species, *C. neocallosa* (Egypt, Jordan, Israel, Saudi Arabia, Syria and Turkey) and *C. mandibularis* (Cyprus, Egypt, Israel, Jordan, Lebanon, Syria, Turkey and West Bank) have similar distribution ranges, occurring in Asia and Africa. Eleven species occur in both Europe and Asia: *Ceratina acuta*, *C. chalcites*, *C. chrysomella*, *C. gravidula, C. loewi, C. nigrolabiata, C. sakagamii, C. schwarziana, C. tibialis, C. bispinosa* and *C. schwarzi,* and could be treated in the Asiatic-European chorotype. Nine species and one subspecies occur only in Asia: *Ceratina bifida, C. chalcites ebmeri, C. christellae, C. denesi, C. hakkarica, C. rasmonti, C. moricei, C. schwarziana C. warnckei* and *C. zwakhalsi.* Among them, *C. denesi, C. hakkarica, C. rasmonti, C. warnckei* and *C. chalcites ebmeri* are Anatolian endemics, comprising more than 20% of the Turkish Ceratinini. Even *C. chalcites ebmeri* is endemic to Hakkâri. With *Exoneuridia hakkariensis*, the numbers of Anatolian endemic taxa comes to six. Moreover, 12 species and one subspecies of *Ceratina* and one species of *Exoneuridia, E. hakkariensis,* total 14 taxa, have been described from Turkey, of which, six have type localities in Hakkâri: *C. hakkarica, C. schwarziana, C. warnckei, C. zwakhalsi, C. chalcites ebmeri* and *E. hakkariensis*. Furthermore, apart from *E. hakkariensis*, 14 Turkish *Ceratina* species and subspecies (50%) occur in Hakkâri Province.

Topographic and climatic conditions are varied in Anatolia, with many mountainous regions but also low-lying plains and coastal strips. In eastern Anatolia, the elevation of mountains exceeds 2500-3000 m with narrow valleys and plains. Overall, it comprises a vast and biologically rich landscape, which is the main reason Anatolia, especially its eastern part, has high biodiversity. Terzo (1998) studied the genus *Ceratina* in the Near East and recorded 28 species including eight new species. He emphasized that in the Western Palearctic region, the eastern part of Turkey is a very important distribution center; all species of the subgenus *Euceratina* occurring in the Near East are present in eastern Turkey and not the reverse. This is the case for bumblebees (Reinig & Rasmont 1983) and some other bees, such as Osmiini and Melittidae (Özbek, 2013a, 2013b, 2013c, 2014). Another important distribution area for *Ceratina* bees is the Çukurova plain in the Mediterranean region. This location is convenient for thermophile species. Additionally, nesting plants (especially *Rubus* spp.) could be easily available in Çukurova. The present study and that of Terzo *et al.* (1999) show that 12 species (*C. bifida, C. bispinosa, C. chalybea, C. chrysomella, C. cucurbitina, C. dallatorreana, C. loewi, C. mandibularis, C. moricei, C. nigroaenea, C. parvula and C. schwarzi*) live on the Çukurova plain.

Concerning floral records, visiting plants for most of the *Ceratina* bees were detected. As cultivated plants, common sainfoin (*O. viciifolia*) and pepper (*C. annuum*) were found to be visited by certain species. Özbek (2011) noted the importance of *C. chalcites* in the pollination of *O. viciifolia,* which is a valuable forage legume in temperate regions. Additionally, it was first determined that *C. bispinosa* and *E. hakkariensis* visited *C. annuum,* which is the most common and extensively cultivated vegetable in Turkey, particularly in southeastern Anatolia (Aybak, 2002). Various plant species in the genera *Eryngium*, *Centaurea*, *Echium*, *Carduus, Onopordum* and *Vitex* are most frequently visited by most *Ceratina* species. Related to this, Terzo & Rasmont (2004) emphasized that small carpenter bees are polylectic; flowering plants are probably not a limiting factor of their distribution. On the contrary, their nesting behaviors restrict their distribution to habitats rich in *Rubus* species or in substitution plants, such as *Verbascum*.

In conclusion, the present paper reveals that the tribe Ceratinini includes 27 species and two subspecies in the genus *Ceratina*, and the Allodapini tribe, one species in the genus *Exoneuridia.* Moreover, currently 10 *Xylocopa* (Xylocopini) species occur in Turkey (Özbek, 2013a; Terzo & Rasmont, 2014). All in all, the present data allow us to reach the conclusion that in Turkey there is currently a total of 38 species and 2 subspecies of the subfamily Xylocopinae (Tab. I).

It is hoped that this study will stimulate further studies on this subfamily, because there are certain species that currently occur in neighboring countries, such as *C. cypriaca* Mavromoustakis, 1949 (in Cyprus); *C. dalyi* Terzo, 1998 (in Iran); C. *teunisseni* Terzo & Rasmont, 1997 (in Crete) and *C. zandeni* Terzo, 1998 (in Greece) (Terzo, 1998; Terzo & Rasmont, 2011), which have not been recorded from Turkey. We hypothesize that these species could also be found in Turkey. Additionally, there are certain species that are known from one or two localities, even as a single record and a single sex, so with further researches in different parts of the country, the recorded Turkish Xylocopinae fauna will be considerable improved.

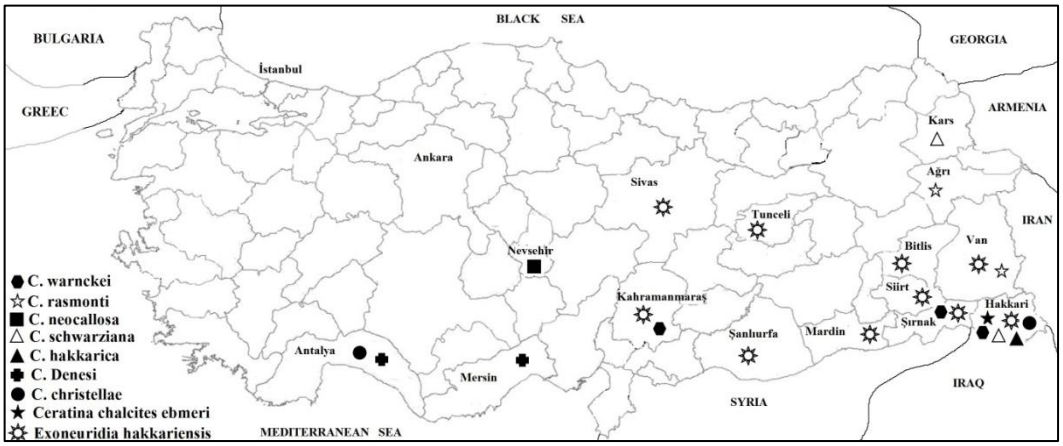

Figure 1. Distribution map for rare *Ceratina* species and *Exoneuridia hakkariensis* in Turkey.

Table I. Check-list of the subfamily Xylocopinae of Turkey.

Tribe and Genus	Taxa	Distribution in Turkey	References
Ceratinini, *Ceratina* Latreille, 1802	1.*Ceratina (Ceratina) cucurbitina* (Rossi, 1792)	Adana, Adıyaman, Antalya, Aydın, Bilecik, Bingöl, Elazığ, Eskişehir, Gaziantep, Hatay, Isparta, İzmir, Konya, Mersin, Muğla, Osmaniye, Şanlıurfa	Present study; Terzo *et al*. (1999); Terzo & Rasmont (2011)
	2.*Ceratina* (*Dalyatina*) *parvula* Smith, 1854	Adana, Antalya, Aydın, Gaziantep, Hatay, İzmir, Muğla, Osmaniye	Terzo *et al*. (1999); Terzo & Rasmont (2011)
	3.*Ceratina* (*Euceratina*) *acuta* Friese, 1896	Adana, Antalya, Bilecik, Burdur, Bursa, Erzincan, Erzurum, Hakkâri, İstanbul, Mersin, Osmaniye, Nevşehir, Kahramanmaraş, Kayseri, Isparta, Konya, Eskişehir, Şırnak, Van	Present study; Terzo & Rasmont (1997); Terzo & Rasmont (2011)
	4.*Ceratina* (*Euceratina*) *bifida* Friese, 1900	Adana, Antalya, Mersin, Gaziantep, Hatay, Osmaniye	Present study; Terzo (1998); Terzo *et al.* (1999)
	5.*Ceratina* (*Euceratina*) *chalcites chalcites* Germar, 1839	Adana, Ankara, Aydın, Erzincan, Kars Erzurum, Hakkâri, Istanbul, İzmir, Kahramanmaraş, Niğde, Osmaniye, Van	Present study; Terzo & Rasmont (2011)
	5a.*C.*(*Euceratina*) *chalcites ebmeri* Terzo, 1998	Hakkâri (endemic to Hakkâri)	Terzo (1998)
	6.*Ceratina* (*Euceratina*) *chalybea* Chevrier, 1872	Adana, Artvin, Bolu, Bursa, Çankırı, Denizli, Erzurum, Hakkâri, Iğdır, Kars, Kastamonu, Kayseri, Konya, Mersin, Muş, Osmaniye, Şırnak, Van	Present study; Terzo & Rasmont (1998); Terzo *et al*. (1999); Terzo & Rasmont (2011)
	7.*Ceratina* (*Euceratina*) *christellae* Terzo, 1998	Antalya, Hakkâri	Terzo (1998)

Tribe and Genus	Taxa	Distribution in Turkey	References (Table I – continued)
Ceratinini, *Ceratina* Latreille, 1802	8.*Ceratina* (*Euceratina*) *chrysomella* Gerstäcker, 1869	Adana, Antalya, Gaziantep, Hakkâri, Hatay, İzmir, Kayseri, Kahramanmaraş, Mardin, Mersin, Muğla, Ordu, Osmaniye	Present study; Terzo (1998); Terzo & Rasmont (2011)
	9.*Ceratina* (*Euceratina*) *cyanea* (Kirby, 1802)	Aksaray, Ardahan, Artvin, Çankırı, Erzincan, Erzurum, Eskişehir, Hakkâri, Iğdır, Kars, Konya, Niğde, Şanlıurfa	Present study; Terzo & Rasmont (2011)
	10.*Ceratina* (*Euceratina*) *dallatorreana* Friese, 1896	Adana, Antalya, Aydın, Burdur, Bursa, Erzincan, Gaziantep, Hatay, Isparta, İstanbul, Kahramanmaraş, Kayseri, Mersin, Osmaniye, Samsun	Terzo & Rasmont (2011)
	11.*Ceratina* (*Euceratina*) *denesi* Terzo, 1998	Antalya, Mersin	Present study; Terzo (1998)
	12.*Ceratina* (*Euceratina*) *dentiventris* Gerstäcker, 1869	Adana, Ankara, Aydın, Bilecik, Erzincan, Gaziantep, Hakkâri, Kayseri, Mersin, Şanlıurfa	Present study; Terzo & Rasmont (2011)
	13.*Ceratina* (*Euceratina*) *gravidula* Gerstäcker, 1869	Amasya, Artvin, Aydın, Bursa, Erzurum, İzmir, Kars, Muğla	Present study; Terzo & Rasmont (1996)
	14.*Ceratina* (*Euceratina*) *hakkarica* Kocourek, 1998	Hakkâri	Kocourek (1998)
	15.*Ceratina* (*Euceratina*) *loewi* Gerstäcker, 1869	Adana, Antalya, Aydın, Balıkesir, Bilecik, Burdur, Bursa, Çanakkale, Denizli, Hatay, İzmir, Karaman, Kayseri, Mersin, Muğla, Niğde, Osmaniye, Sakarya	Present study; Friese (1901); Terzo & Rasmont (2011)
	16.*Ceratina* (*Euceratina*) *mandibularis* Friese, 1896	Adana, Antalya, Denizli, Diyarbakir, Hatay, Gaziantep, Kayseri, Kilis, Mersin, Osmaniye	Present study; Terzo (1998); Terzo & Rasmont (2011)
	17. *Ceratina* (*Euceratina*) *moricei* Friese, 1899	Adana, Antalya, Gaziantep, Hatay, Kilis, Mardin, Mersin, Osmaniye, Muğla, Nevşehir	Present study; Friese (1899); Terzo *et al*. (1999)
	18. *Ceratina* (*Euceratina*) *neocallosa* Daly, 1983	Nevşehir	Terzo &Rasmont (2011)
	19. *Ceratina (Euceratina) nigroaenea* Gerstäcker, 1869	Adana, Amasya, Antalya, Aydın, Bursa, Erzincan, Erzurum, Gaziantep, Hatay, İzmir, Karaman, Kars, Mardin, Mersin, Muğla, Samsun, Osmaniye	Present study; Terzo & Rasmont (1996); Terzo & Rasmont (2011)
	20. *Ceratina* (*Euceratina*) *nigrolabiata* Friese, 1896	Adıyaman, Ankara, Antalya, Ardahan, Artvin, Aydın, Burdur, Çankırı, Çorum, Erzincan, Erzurum, Hakkâri, Iğdır, Isparta, İzmir, Kahramanmaraş, Karaman, Kars, Kayseri, Konya, Muğla, Nevşehir, Niğde	Present study; Terzo &Rasmont (2011)
	21.*Ceratina* (*Euceratina*) *rasmonti* Terzo, 1998	Ağrı, Van	Terzo (1998)
	22.*Ceratina* (*Euceratina*) *sakagamii* Terzo, 1998	Ağrı, Hakkâri, Kars, Konya, Mersin, Nevşehir, Niğde, Van	Terzo (1998); Terzo & Rasmont (2011)
	23.*Ceratina* (*Euceratina*) *schwarziana* Terzo, 1998	Hakkâri, Kars	Present study; Terzo (1998)
	24.*Ceratina* (*Euceratina*) *tibialis* Morawitz, 1895	Adana, Adıyaman, Dıyarbakır, Gaziantep, Hatay, Mersin, Şanlıurfa	Present study; Terzo & Rasmont (2011)
	25.*Ceratina* (*Euceratina*) *warnckei* Terzo, 1998	Hakkâri, Kahramanmaraş, Şırnak	Terzo (1998)
	26.*Ceratina* (*Euceratina*) *zwakhalsi* Terzo and Rasmont, 1997	Ağrı, Bitlis, Elazığ, Erzincan, Erzurum, Hakkâri, Kahramanmaraş, Kars, Mersin, Muş, Niğde, Siirt, Sivas, Şırnak, Van	Present study; Terzo & Rasmont (1997, 2011)
	27.*Ceratina* (*Neoceratina*) *bispinosa* Handlirsch, 1889	Adana, Adıyaman, Antalya, Aydın, Diyarbakır, Şanlıurfa, Hakkâri, Hatay, İstanbul, İzmir, Mersin, Muğla, Osmaniye	Present study; Kocourek (1998);Terzo *et al*. (1999); Terzo & Rasmont (2011)
	28.*Ceratina* (*Neoceratina*) *schwarzi* Kocourek, 1998	Adana, Aydın, Bilecik, Elazığ, Gaziantep, Hakkâri, Hatay, Kahramanmaraş, Karaman, Konya, Malatya, Mardin, Mersin, Muğla, Nevşehir, Sivas, Şanlıurfa,	Terzo (1998);Terzo *et al*. (1999); Terzo &Rasmont (2011)

Tribe and Genus	Taxa	Distribution in Turkey	References (Table I – continued)
Allodapini, *Exoneuridia* Cockerell, 1119	1. *Exoneuridia hakkariensis* (Warncke, 1983)	Bitlis, Hakkâri, Kahramanmaraş, Mardin, Siirt, Sivas, Şanlıurfa, Şırnak, Tunceli, Van	Present study; Warncke (1983); Terzo (1999)
Xylocopini, *Xylocopa* Latreille, 1802	1. *Xylocopa (Ancylocopa) parviceps* Morawitz, 1895	Ağrı, Adıyaman, Bitlis (Adilcevaz, 1850 m, 20.VII.1999, leg. H. Özbek), Hakkâri, İzmir, Kayseri, Kahramanmaraş, Konya, Mersin, Muş, Sivas, Van	Warncke (1976, 1982); Özbek (2013a); Terzo & Rasmont (2014)
	2. *Xylocopa (Copoxyla) armeniaca* Warncke, 1982	Ağrı, Erzurum, Hakkâri, Kars, Şırnak, Van	Warncke (1982); Özbek (2013a); Terzo & Rasmont (2014)
	3. *Xylocopa (Copoxyla) iris* (Christ, 1791)	Adana, Ağrı, Adıyaman, Amasya, Ankara, Antalya, Ardahan, Artvin, Aydın, Balıkesir, Bitlis, Burdur, Bursa, Çanakkale, Çorum, Denizli, Edirne, Elazığ, Eskişehir, Erzincan, Erzurum, Gaziantep, Hakkâri, Isparta, İzmir, Karaman, Kars, Kayseri, Kocaeli, Konya, Mersin, Muğla, Niğde, Osmaniye, Samsun, Şırnak, Tokat, Van, Yalova	Warncke (1982); Özbek (2013a); Terzo & Rasmont (2014)
	4. *Xylocopa (Koptortosoma) pubescens* Spinola, 1838	Adana, Antalya, Hatay, Kahramanmaraş, Kars, Mersin, Osmaniye	Warncke (1982); Özbek (2013a); Terzo & Rasmont (2014)
	5. *Xylocopa (Proxylocopa) olivieri* Lepeletier, 1841	Adana, Adıyaman, Ağrı, Ankara, Antalya, Artvin, Balıkesir, Bitlis, Çanakkale, Denizli, Elazığ, Erzincan, Erzurum Hakkâri, Hatay, Iğdır, Isparta, Kahramanmaraş, Kars, Kayseri, Konya, Mersin, Muğla, Niğde, Van	Warncke (1982); Özbek (2013a); Terzo & Rasmont (2014)
	6. *Xylocopa (Proxylocopa) rufa* Friese, 1901	Şanlıurfa	Terzo & Rasmont (2014)
	7. *Xylocopa (Xylocopa) iranica* Maa,1954	Erzurum	Terzo & Rasmont (2014)
	8. *Xylocopa (Xylocopa) valga* Gerstäcker, 1872	Adıyaman, Ankara, Artvin, Bingöl, Çorum, Erzincan, Erzurum, Eskişehir, Gümüşhane, Hakkâri, Hatay, Iğdır, Isparta, İzmir, Kars, Kayseri, Kırıkkale, Konya, Mersin, Niğde, Samsun, Sıvas, Van	Warncke (1982); Özbek (2013a); Terzo & Rasmont (2014)
	9. *Xylocopa (Xylocopa) varentzowi* Morawitz, 1895	Adıyaman, Erzincan, Eskişehir, Hakkâri, Kahramanmaraş, Mersin, Muğla, Sivas	Terzo & Rasmont (2014)
	10. *Xylocopa (Xylocopa) violacea* (L. 1758)	Adana, Ağrı, Ardahan, Artvin, Aydın, Antalya, Bitlis, Burdur, Bursa, Çanakkale, Çankırı, Erzincan, Erzurum, Gümüşhane, Hakkâri, Hatay, Isparta, Kars, Konya, Mersin, Muğla, Niğde, Samsun, Sinop, Trabzon, Van	Warncke (1982); Özbek (2013a); Terzo & Rasmont (2014)

Acknowledgements

We are grateful to Miktat Doğanlar, Rüstem Hayat, Erol Yıldırım, Irfan Aslan, Önder Çalmaşur, Göksel Tozlu, Saliha Çoruh, Coşkun Güçlü, Memiş Kesdek and A. Akkaya who helped to collect some of the bee samples in the field. We also thank Ebru Jeren Fidan (Eskişehir Osmangazi University) who kindly prepared the map. Thanks to the anonymous reviewers who helped to improve the manuscript. We also thank Myra Poznanović for language editing and proofreading of an earlier version of the manuscript, and Ebru Jeren Fidan (Eskişehir Osmangazi University and İbrahim Yücel Özbek (Atatürk University, Erzurum) who kindly prepared the map.

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ПОДАЦИ О РАСПРОСТРАЊЕЊУ ТРИБУСА CERATININI И ALLODAPINI (HYMENOPTERA: APIDAE) И ПОПИС ПОДФАМИЛИЈЕ XYLOCOPINAE У ТУРСКОЈ

ХИКМЕТ ОЗБЕК и МИХАЕЛ ТЕРЗО

Извод

Описана су истраживања пчела сакупљених у различитим деловима Турске од 1970. године. На основу детерминисаног материјала и прегледом литературе закључено је да род *Ceratina* Latreille (Ceratinini) садржи 27 врста и две подврсте, док је род *Exoneuridia* Cockerell (Allodapini) заступљен са само једном врстом у Турској. Детерминацијом врста *Xylocopa* spp. повећан је број од 10 до сада познатих на 38 врста и две подврсте у Турској. Свака врста има различит опсег распрострањења, неке *Ceratina* су широко или средње распрострањене, док су неке веома ретке, као: *C. christellae*, *C. hakkarica*, *C. neocallosa, C. rasmonti*, *C. warnckei*, *C. schwarziana.*

Ceratina chalcites ebmeri, *C. denesi, C. hakkarica, C. rasmonti, C. warnckei* и *Exoneuridia hakkariensis* су ендемити Анадолије.

Важно је истаћи да је 12 таксона рода *Ceratina* и *E. hakkariensis* описано из Турске, а за шест таксона Хакари је „locus typicus“ (*C. hakkarica*, *C. schwarziana*, *C. warnckei*, *C. zwakhalsi*, *C. chalcites ebmeri* and *E. hakkariensis*). Источни део Турске, посебно Хакари је важан центар специјације *Ceratinin*-а.

На карти су приказана распрострањења ретких врста. По први пут је објављен списак Xylocopinae Турске.

Received: August 5th,2016.
Accepted: November 14th, 2016.